



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,685	04/16/2004	Suning Wang	2002-033-03US	8860

7590 08/08/2007
Carol Miernicki Steeg
PARTEQ Innovations
Room 1625, Biosciences Complex
Queen's University at Kingston
Kingston, ON K7L 3N6
CANADA

EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
----------	--------------

1774

MAIL DATE	DELIVERY MODE
-----------	---------------

08/08/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/825,685	Applicant(s) WANG ET AL.	
	Examiner Marie R. Yamnitzky	Art Unit 1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,5-15,17-22 and 32-52 is/are pending in the application.
- 4a) Of the above claim(s) 8,9,15,32-39,48,51 and 52 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 19-22 is/are allowed.
- 6) ☒ Claim(s) 2,5,11-14,40-47,49 and 50 is/are rejected.
- 7) ☒ Claim(s) 6,7,17 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1774

1. This Office action is in response to applicant's amendment filed May 15, 2007, which cancels claims 1, 3, 4, 16 and 23-31, amends claims 2, 5-11 and 32-36, and adds claims 40-52.

Claims 2, 5-15, 17-22 and 32-52 are pending.

2. The claims remain subject to restriction and election of species requirements. Claims 2, 5-7, 10-14, 17-22, 40-47, 49 and 50 are currently subject to examination.

3. Claims 8, 9, 51 and 52 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement with respect to this invention in the reply filed on August 29, 2006.

Claims 15, 32-39 and 48 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse with respect to the species in the reply filed on August 29, 2006.

4. The rejection of claim 10 under 35 U.S.C. 112, 2nd paragraph, as set forth in the Office action mailed November 15, 2006 is overcome by claim amendment.

The rejection of claims 1-7 as anticipated by Sun et al. in *Chem. Commun.* (2003) is partly rendered moot by claim cancellation and otherwise overcome by claim amendment. For the record, the examiner notes that given the disclosure of present applicant's provisional priority

application, the Sun et al. reference should have been applied under 35 U.S.C. 102(a) rather than 102(b). The Sun et al. reference is applicable to new claim 40 and some claims dependent therefrom for reasons set forth later in this action.

The rejections under 35 U.S.C. 102(b) and 103(a) based on JP 2001-23777 as set forth in the November 15th action are partly rendered moot by claim cancellation and otherwise overcome by claim amendment. This reference does not disclose or suggest compounds of formula (1) as defined in present independent claims 5 and 40, each of which require X¹-X⁴ to be nitrogen.

5. Claims 40-47, 49 and 50 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Support is not clear for the recitation in new independent claim 40 that a said substituent “is not further substituted”.

6. Regarding claims 2 and 41, absent objective evidence to the contrary, all compounds within the scope of present formula (1) as defined in claims 5 and 40 are considered to be capable of exhibiting photoluminescence and/or electroluminescence.

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 2, 5, 11-14, 40, 41 and 44-47 are rejected under 35 U.S.C. 102(b) as being anticipated by Wu et al. in *Transition Metal Chem.*, 24, pp. 299-303 (1999).

Wu et al. disclose 2-(4-R-phenyl)imidazo[4,5-f][1,10]phenanthroline wherein R is H, OH, OMe, NMe₂, Cl or NO₂.

The prior art compounds in which R is H, OH, OMe, Cl or NO₂ are compounds having formula (1) as defined in present independent claims 5 and 40 wherein Y is hydrogen and Z is an unsubstituted phenyl (when R is H in the prior art), or a substituted phenyl wherein the substituent is an alkoxy group (when R is OMe), a hydroxy group (when R is OH), a halo group (when R is Cl) or a nitro group (when R is NO₂).

The prior art compound in which R is NMe₂ is a compound having formula (1) as defined in present claim 40 wherein Y is hydrogen and Z is a substituted phenyl group wherein the substituent is an amino group.

Given the open claim language of “having” in a “compound having a formula (1)”, it is the examiner’s position that the ruthenium complexes comprising an imidazophenanthroline compound of present formula (1) also meet the limitations of the independent claims since the

Art Unit: 1774

formula (1) structure is part of the ruthenium complex structure, with those complexes that are disclosed as photoluminescent further meeting the limitations of claims 2 (R is H, OH, OMe or Cl) and 41 (R is H, OH, OMe, NMe₂ or Cl).

With respect to claims 11-14 and 44-47, the prior art discloses compositions and photoluminescent products utilizing ruthenium complexes comprising 2-(4-R-phenyl)imidazo[4,5-f][1,10]phenanthroline wherein R is H, OH, OMe, NMe₂ or Cl.

9. Claims 40-43, 46 and 47 are rejected under 35 U.S.C. 102(b) as being anticipated by Bian et al. in *Polyhedron*, 21, pp. 313-319 (2002; Feb. 15, 2002).

Scheme 1 on p. 314 depicts two compounds of formula (1) as defined in present claim 40 wherein Y is hydrogen, Z is a substituted phenyl, and the substituent on the phenyl is an amino group. These prior art compounds meets the limitations of present claims 40 and 41.

Scheme 1 on p. 314 depicts two compounds of formula (1) as defined in present claim 40 wherein Y is an aliphatic group having 2 carbon atoms, Z is a substituted phenyl, and the substituent on the phenyl is an amino group. This prior art compound meets the limitations of present claims 40-43.

Given the open claim language of “having” in a “compound having a formula (1)”, it is the examiner’s position that the europium complexes comprising imidazophenanthroline meet the claim limitations since the formula (1) structure is part of the europium complex structure.

With respect to claims 46 and 47, see the Introduction on page 313.

10. Claims 40-43, 46, 47, 49 and 50 are rejected under 35 U.S.C. 102(a) as being anticipated by Sun et al. in *Chem. Commun.*, pp. 702-703 (published on Web 02/17/2003).

The compound represented by the second formula in Scheme 1 on p. 702 is a compound of formula (1) as defined in present claim 40 wherein Y is hydrogen, Z is a substituted phenyl, and the substituent on the phenyl is an amino group. This prior art compound meets the limitations of present claims 40 and 41.

The compound represented by the third formula in Scheme 1 on p. 702 is a compound of present formula (1) wherein Y is an aliphatic group having 2 carbon atoms, Z is a substituted phenyl, and the substituent on the phenyl is an amino group. This prior art compound meets the limitations of present claims 40-43.

Given the open claim language of “having” in a “compound having a formula (1)”, it is the examiner’s position that the europium complex represented by the fourth formula in Scheme 1 also meets the limitations of present claims 40-43 since the formula (1) structure is part of the europium complex structure.

With respect to claims 46, 47, 49 and 50 the prior art discloses electroluminescent products/devices utilizing the europium complex represented by the fourth formula in Scheme 1 as an emitter. The additional device components recited in claims 49 and 50 are disclosed by Sun et al.

11. Claims 2, 5, 11-14, 40, 41 and 44-47 are rejected under 35 U.S.C. 102(a) as being anticipated by Zhang et al. in *Inorganica Chimica Acta*, 339, pp. 34-40 (2002; Nov. 15, 2002).

The imidazophenanthroline compounds abbreviated as HPIP and HNAIP by Zhang et al. are compounds represented by formula (1) as defined in present claims 5 and 40 wherein Y is hydrogen, Z is a substituted phenyl (in HPIP) or substituted naphthyl (in HNAIP), and the substituent is a hydroxy group. These two compounds meet the limitations of claims 2, 5, 40 and 41.

Given the open claim language of “having” in a “compound having a formula (1)”, it is the examiner’s position that the cobalt complexes comprising an imidazophenanthroline compound of present formula (1) also meet the limitations of claims 2, 5, 40 and 41 since the formula (1) structure is part of the cobalt complex structure, and the complexes are photoluminescent.

With respect to claims 11-14 and 44-47, the prior art discloses compositions and photoluminescent products utilizing the cobalt complexes comprising the imidazophenanthroline compounds.

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 44, 45, 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bian et al. in *Polyhedron*, 21, pp. 313-319 (2002; Feb. 15, 2002) as applied to claims 40-43, 46 and 47 above, and further in view of Mori et al. (US 5,281,489).

Bian et al. disclose europium complexes comprising the formula (1) structure, and suggest that the complexes will be useful as luminescent emitters in electroluminescent devices.

Bian et al. do not explicitly disclose a composition as in claims 44 and 45, or the electroluminescent device structure as in claims 49 and 50.

Mori et al. disclose electroluminescent devices made by depositing a combination of materials including an emitting material. The emitting material may be a europium complex as taught in the paragraph bridging columns 24 and 25. Polymeric materials may be used in combination with the emitting material, such as when one or more of the additional functional components in the emissive layer is in the form of a polymer (e.g. see c. 4, l. 37-39, c. 8, l. 15-17 and c. 25, l. 11-15) and/or when the emissive layer also comprises a binder polymer (e.g. see c. 27, l. 15-30). The composition used to make the emitting layer may also comprise a solvent, such as when the emitting layer is made by solution coating (e.g. see c. 27, l. 43-61).

A pair of electrodes as required by present claim 49 is a standard component of an electroluminescent device, and the additional functional layers required for the device of present claim 50 were known in the art at the time of the invention. Mori et al. teach the basic layered device structures required by claims 49 and 50 (e.g. see c. 28, l. 63-c. 29, l. 16).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to utilize europium complex comprising the formula (1) structure as taught by Bian

to make electroluminescent devices having layered structures as known in the art at the time of the invention, such as taught by Mori. It would have been *prima facie* obvious to one of ordinary skill in the art to combine a europium complex as taught by Bian with a solvent and a polymer in order to make an emitting layer by solution coating as taught by Mori.

14. In the response filed May 15, 2007, applicant did not set forth any specific arguments with respect to the patentability of new independent claim 40 over the previously applied prior art of Sun et al. Claim 40 is similar to original claim 5, which was rejected as anticipated by Sun et al. Claim 40 differs from original claim 5 only in that claim 40 recites that a said substituent “is not further substituted”. Claim 40 allows a said substituent that is not further substituted to be an amino group. In the event that applicant intends this amino group to be limited to $-NH_2$, the examiner notes that there is no basis in the application as originally filed for giving such a narrow interpretation to the phrase “amino group”. The examiner interprets the phrase “amino group” as encompassing amino groups of the formulae $-NH_2$, $-NHR$, and $-NR_2$, wherein each R in $-NR_2$ may be the same or different. The examiner does not consider the R(s) in $-NHR$ and $-NR_2$ to be excluded by the phrase “is not further substituted”.

15. This action is not made final because the examiner had not previously considered prior art disclosing metal complexes of compounds represented by formula (I), such as in the Sun et al. article, to be applicable to composition and product claims which recite “comprising a compound as claimed in claim...”. However, upon further consideration, the claims were previously

Art Unit: 1774

interpreted too narrowly as the open claim language of “comprising a compound” does not necessarily exclude compositions/products in which the compound is present as a component of a metal complex. Further, the independent claim language of a compound “having” a formula (1) is open and does not necessarily exclude compounds in which the formula (1) structure is a portion of the overall compound structure (as opposed to a “compound represented by formula (1)”).

16. Claims 10 and 19-22 are allowed. Reasons for allowance are as indicated on pages 7 and 8 of the Office action mailed November 15, 2006.

Claims 6, 7, 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art does not disclose or suggest a compound having formula (1) as further defined by claim 6 or claim 7, and does not disclose or suggest an electroluminescent device as claimed in claims 17 and 18 comprising the electroluminescent compound required by these claims.

17. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
August 02, 2007



MARIE YAMNITZKY
PRIMARY EXAMINER

1774